Online Appendix

In this appendix we provide more details about the derivations of the model.

A1. Households

The economy is populated by a continuum of infinitely-lived households in the $[0,1]$ space each supplying differentiated labor. A fraction $\eta$ of households consists of Ricardian agents, i.e., they choose consumption and labor supply by solving an intertemporal optimization problem, hold capital and have access to financial markets. Accordingly, the representative Ricardian household chooses bonds purchases, the capital stock to rent out to firms, investment, and the utilization rate of capital. The remaining fraction $(1 - \eta)$ of households consist of non-Ricardian agents, i.e., they have no access to financial markets and do not own capital. Thus, they just consume their current labor income without solving an intertemporal optimization problem.

The representative Ricardian household maximizes its discounted intertemporal utility function under the budget constraint. The marginal utility of consumption ($U_{C,t}^R$) is then given by

$$U_{C,t}^R = \frac{1}{1 + \tau^R_t} \left[ v_t^b (C_t^R - hC_{t-1}^R)^{-\sigma} - \beta h E_t v_{t+1}^b (C_{t+1}^R - hC_t^R)^{-\sigma} \right]. \tag{A1}$$

The maximization of the utility function with respect to sovereign bonds leads to the Euler equation which governs the intertemporal consumption choice

$$\beta R_t^G E_t \frac{\Lambda_{t,t+1}}{\Pi_{t+1}} = 1, \tag{A2}$$

where $\Lambda_{t,t+1} \equiv U_{C,t+1}^R / U_{C,t}^R$ defines the stochastic discount factor and $\Pi_{t+1} \equiv P_{t+1}/P_t$ is the expected gross inflation rate.

Households own capital and, then, have to choose the level of investment, accumulation and utilization rate of capital. The following set of first order conditions describes these choices:

$$1 = \tau^I_t + Q_t v_t^{inv} \left[ 1 - F \left( \frac{I_t^{R}}{I_{t-1}^{R}} \right) - \frac{I_t^{R}}{I_{t-1}^{R}} F' \left( \frac{I_t^{R}}{I_{t-1}^{R}} \right) \right] + \beta E_t \Lambda_{t,t+1} v_{t+1}^{inv} \left( \frac{I_{t+1}^{R}}{I_t^{R}} \right)^2 F' \left( \frac{I_{t+1}^{R}}{I_t^{R}} \right) \tag{A3}$$

$$Q_t = \beta E_t \Lambda_{t,t+1} \left[ (1 - \tau^K_t) R_{t+1}^k u_{t+1} + Q_{t+1} (1 - \delta (u_{t+1})) \right], \tag{A4}$$

$$R_t^k = Q_t \frac{\delta' (u_t)}{(1 - \tau^K_t)}. \tag{A5}$$
where $Q_t$ denotes the Tobin’s $Q$ representing the ratio between the value of installed capital and its replacement cost. Whenever $Q > 1$, the market value of physical capital is greater than its replacement cost and households accumulate capital.\footnote{In the opposite case (i.e., $Q < 1$) households should reduce their capital stock.} As a consequence, net investment in physical capital depends on the $Q$’s value.

Equation (A3) describes the investment dynamics, while equation (A4) states that the value of installed capital depends on its expected future value rescaled by the depreciation rate. Moreover, the expected future rental rate and capital utilization also affect the value of installed capital. Finally, condition (A5) implies that the cost of higher capital utilization equals the rental price of capital services.

Looking at the non-Ricardian household, their marginal utility of consumption ($U_{C,t}^{NR}$) is

$$U_{C,t}^{NR} = \frac{1}{(1 + \tau_t^l)} \left[ v_t^b \left( C_t^{NR} - hC_{t-1}^{NR} \right)^{-\sigma_c} - \beta h E_t v_{t+1}^b \left( C_{t+1}^{NR} - hC_t^{NR} \right)^{-\sigma_c} \right]. \tag{A6}$$

A2. Wage Setting

We posit that households supply differentiated labor, so there is monopolistic competition in the labor market. As a consequence, households are wage setters and choose the wage that maximizes their utility. Wages are sticky. In each period a random fraction $(1 - \omega_t)$ of households are able to post a new wage. Moreover, non-updating households can index their nominal wage to lagged inflation at rate $\zeta_w$. We denote by $\omega_t^i \equiv W_t^i / P_t$ the real wage, with $i \in \{R, NR\}$.

The optimal real wage, i.e., the wage that maximizes the intertemporal utility function, is

$$\left( \omega_t^* \right)^{(1 + \epsilon_t^w \varphi)} = \frac{\epsilon_t^w}{\epsilon_t^w - 1} \frac{x_{1,t}^{w^i}}{x_{2,t}^{w^i}} \tag{A7}$$

where $x_{1,t}^{w^i}$ and $x_{2,t}^{w^i}$ are two auxiliary variables evolving as

$$x_{1,t}^{w^i} = v_t^b v_t^p \chi_t^i \left( 1 - s b_t + \tau_t^F \right)^{-\epsilon_t^w (1 + \varphi)} \left( \omega_t^i \right)^{\epsilon_t^w (1 + \varphi)} N_t^i + \beta \theta_w \Pi_t^c \zeta_w \epsilon_t^w (1 + \varphi) E_t \Pi_{t+1}^{c_{t+1}} x_{1,t}^{w^i} \tag{A8}$$

$$x_{2,t}^{w^i} = U_{C,t}^i \left( 1 - \tau_t^N - \tau_t^H \right) (1 - s b_t + \tau_t^F)^{-\epsilon_t^w (1 + \varphi)} N_t^i + \beta \theta_w \Pi_t^c \zeta_w (1 - \epsilon_t^w) E_t \Pi_{t+1}^{c_{t+1}} x_{2,t+1}^{w^i}. \tag{A9}$$

A3. Firms

We assume imperfect competition in the final goods market in the form of monopolistic competition. There is a continuum of firms indexed by $i \in [0, 1]$. Firms are assumed to pay social
contributions (at a rate $\tau^F_t$) and may receive incentives in the form of subsidies for hiring workers (at a rate $sub_t$). Cost minimization under the constraint given by the production function entails the following aggregate factor demands

\[
\omega_t^R = MC_t(1 - \alpha)\eta \frac{Y_t}{(1 - sub_t + \tau^F_t)N_t},
\]

\[
\omega_t^{NR} = MC_t(1 - \alpha)(1 - \eta) \frac{Y_t}{(1 - sub_t + \tau^F_t)N_t},
\]

\[
R_t^k = MC_t \alpha \frac{Y_t}{K_t},
\]

where $MC_t$ is the real marginal cost that is common to all firms.

A4. Price Setting

Given the presence of monopolistic competition in the goods market, firms are price makers and face nominal price rigidities. Thus, each firm can reset its price with probability $(1 - \theta_p)$ in any given period. In each period a fraction $(1 - \theta_p)$ of producers is allowed to reset their price, while the remaining fraction do not. Moreover, we allow non-resetting firms to index their price to past inflation, according to a parameter $\zeta_p$. The representative firm chooses its reset price that maximizes the discounted sum of its profits. The reset price inflation is

\[
\Pi_t^* = \frac{\varepsilon_p}{\varepsilon_p - 1} \frac{x_{1,t}^p}{x_{2,t}^p} \Pi_t,
\]

where $x_{1,t}^p$ and $x_{2,t}^p$ are two auxiliary variables evolving as

\[
x_{1,t}^p = UC_t MC_t Y_t + \theta_p \beta \Pi_t^{-\zeta_p \varepsilon_p} E_t \Pi_{t+1}^{\varepsilon_p - 1} x_{1,t+1}^p;
\]

\[
x_{2,t}^p = UC_t Y_t + \theta_p \beta \Pi_t^{(1-\varepsilon_p)} E_t \Pi_{t+1}^{\varepsilon_p - 1} x_{2,t+1}^p.
\]